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PONTONIINE SHRIMPS (DECAPODA: CARIDEA: PALAEMONIDAE) OF THE NORTHWEST ATLANTIC. II. *PERICLIMENES PATAE,* NEW SPECIES, A GORGONIAN ASSOCIATE FROM SHALLOW REEF AREAS OFF THE TURKS AND CAICOS ISLANDS AND FLORIDA KEYS

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Abstract.—*Periclimenes patae,* a small pontoniine shrimp associated with shallow-water gorgonians, occurs at depths of usually less than 12 m on the fringing reef off Pine Cay in the Turks and Caicos Islands and off Looe Key in the Florida Keys. This new species appears to be most closely related to *P. iridescens* Lebour, 1949, described originally from Bermuda. *Periclimenes patae* can be separated from the holotype of *P. iridescens* by fewer rostral teeth, second pereopods equal or nearly equal in size, chelae of second pereopods lacking distinct teeth, dactyls of pereopods 3–5 entire (not bifid), and a nearly transparent body in life. There is confusion over the previous northwestern Atlantic records for *P. iridescens* from Venezuela, Colombia, Curaçao, Gulf of Mexico, and east coast of the United States. Our observations and research indicate the existence of at least three additional undescribed species within the "iridescens" complex from the western North Atlantic.

This report is the second in a series devoted to the taxonomy, distribution, and ecology of shrimps belonging to the palaemonid subfamily Pontoniinae. The first report (Heard 1986) dealt with the taxonomy of the genus *Neopontonides* Holthuis, 1951.

During April 1988, an undescribed species of *Periclimenes* Costa, was discovered living on gorgonians along the shallow (1–12 m) areas of the fringing reef off Pine Cay, Turks and Caicos Islands (British West Indies). Additional specimens of this species, which were collected off Looe Key in the Florida Keys, were made available to us through the courtesy of Brian Kensley of the National Museum of Natural History. The new species, which most closely resembles *P. iridescens* Lebour, 1949, is described in this report.

The holotype and part of the paratype series are in the collections of the National Museum of Natural History (USNM). Other paratypes have been deposited in the collections of the British Museum (BMNH), Gulf Coast Research Laboratory Museum (GCRL), and Los Angeles County Museum (LACM). Additional specimens have been deposited in the collections of the USNM, and the Marine Environmental Sciences Consortium Museum (MESC), Dauphin Island, Alabama. Additional non-type material has been deposited in the National Museum of Natural History (USNM 252164). The abbreviation CL stands for carapace length, which was measured from the tip of the rostrum to the posterodorsal margin of the carapace.

Periclimenes patae, new species
Figs. 1–4

Material examined.—Fringing reef northwest of Pine Cay, Turks and Caicos Islands, British West Indies (near 21°53'N,

072°05'W): Holotype ♀ (ovigerous, CL 3.8 mm), USNM 252162, on gorgonian, depth 3–4 m, J. A. McLelland (coll.), 18 Nov 1989.—Paratypes: 12 ♀ (ovigerous, CL 3.3–4.2 mm), 12 ♂ (CL 2.6–3.2 mm), USNM 252163, same collection data as holotype.—5 ♀ (ovigerous), 2 ♀, GCRL 1139, same collection data as holotype.—2 ♀ (ovigerous), 2 ♂, BMNH 1990:28:4, on gorgonians, depth 3–4 m, J. A. McLelland (coll.), 17 Nov 1989.—3 ♀ (2 ovigerous), 1 ♂, LACM 88-124.1, on gorgonians, depth 7–8 m, J. A. McLelland (coll.), 16 Nov 1989.—8 ♀ (3 ovigerous), 5 ♂, MESC 6179-10589, on gorgonians, depth 9–10 m, J. A. McLelland (coll.), 19 Nov 1989.—1 ♀ (CL 4.0 mm), illustrated and in collection of RWH, on gorgonian, depth 9–10 m, R. W. Heard (coll.), 12 Apr 1989.—1 ♀ (ovigerous), in collection of RWH, from the gorgonian *Pseudopterogorgia americana* (Gmelin), depth 12 m, S. Spotte/P. M. Bubucis (coll.), 14 Apr 1989.—3 ♀ (2 ovigerous), 4 ♂, GCRL 1140, on gorgonians, depth 4–5 m, J. A. McLelland (coll.), 10 Nov 1989.

Looe Key, Florida Keys, Florida: 3 ♀ (ovigerous), 2 ♂, USNM 252161, poison station #24, upper spur and groove, vertical buttress wall (gorgonians present), 5–6 m, B. Kensley and M. Schotte (coll.), 27 Jan 1983.

Diagnosis.—Small (CL 2.2–4.2 mm), transparent in life. Rostrum nearly straight or curved slightly upward at tip, reaching anteriorly to midregion of second segment of antennular peduncle; 3–6 dorsal teeth, usually 4 in males and 5 in females; often 1, rarely 2, small vestigial anteroventral teeth on larger specimens. Carapace with well developed antennal and hepatic spines, but without postorbital ridge, other spines, or ornamentation. Abdominal pleura broadly rounded; sixth abdominal somite twice as long as fifth. Posterior tip of telson having mesial spines ¾ length of intermediate spines. Cornea of eye as broad as eyestalk, constricted at junction with eyestalk; accessory pigment spot and associated ommatidia present on dorsoproximal margin of cornea. Pereopods 2 equal or subequal in size and development, chelae lacking distinct teeth. Pereopods 3–5 with dactyls entire (not bifid or biunguiculate), propodi having single spine-like seta on distoflexor margin, propodus of pereopod 5 with single row of comb setae on distal margin. Eggs, depending on stage of development, with maximum diameter of 0.5 (undeveloped) to 0.7 mm (hatching stage). Ovigerous females with 10–35 eggs.

Description.—Female: Rostrum (Figs. 1, 4e–h) nearly straight or slightly curved upward at tip, reaching anteriorly to midregion of second segment of antennular peduncle; dorsal surface with 4–6 spines interspersed with setae; second spine on carapace usually even with, or anterior to, orbital margin; posterior tooth distinctly behind orbital margin; ventral surface with several setae in mid-region, occasionally armed with single, small, vestigial tooth near tip, weakly developed lateral carinae present posteriorly. Antennal spine weakly buttressed, well developed, acute, attenuated. Hepatic spine well developed, slightly larger, more robust, and less attenuated than antennal spine. Carapace without postorbital ridge, or other ornamentation or spines. Abdominal pleura broadly rounded; sixth abdominal somite twice as long as fifth but same length as telson, as measured along mid-dorsal surface. Telson (Fig. 3i) with 2 pairs of dorsolateral spines, anterior pair distal to mid-length of segment, posterior pair closer to anterior pair than to end of telson; 3 pairs of apical spines present, lateral spines short, medial (setose) spines three-fourths length of intermediate spines; minute, acute process at apex between medial spines.

Cornea of eye as broad as eyestalk, constricted at junction with eyestalk; accessory pigment spot and associated ommatidia present on dorsoproximal margin of cornea. Antennular peduncle with sharp, slender stylocerite not extending to midline of basal segment; distolateral margin of basal seg-

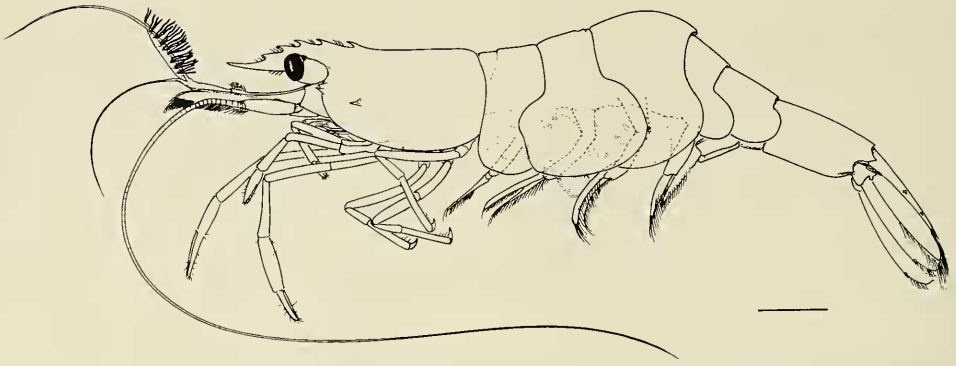

Fig. 1. *Periclimenes patae,* new species, lateral view of holotype (ovigerous female). Right antennule, antenna, and pereopods 3–5 not shown. Scale equals 1.0 mm.

ment with single spine; combined length of second and third segments shorter than basal segment. Lateral antennular flagellum with two branches fused for approximately five joints; extended part of shorter branch consisting of approximately three joints and shorter than fused portion; 6–10 small clusters of aesthetascs present. Antennal scale overreaching antennular peduncle, length ⅓ greater than width, lateral margin nearly straight, distolateral spine not extending to anteromesial angle of blade. Antennal peduncle extending past midpoint of blade; basal segment with lateral spine.

Mandible lacking palp, incisor process ending in 4 distinct teeth, molar process dentate with numerous small spine setae; distal tooth of incisor distinctly larger than the rest. Maxilla 1 with upper endite (lacinia) bearing 5–6 stout apical spine setae interspersed with, or distal to, 8–10 smaller, narrower apical and subapical setae; endite with 4 marginal subapical setae on either side; surface of endite with 3 setae near midpoint. Maxilla 2 with endite entire. Maxilliped 1 with well developed exopodal flagellum bearing 3–4 terminal plumose setae; weakly bilobed epipod present; palp slender and lacking setae. Maxilliped 2 with well developed exopod extending to penultimate segment of endopod and bearing 2 terminal setae. Maxilliped 3 with ischio-merus incompletely fused, fused to basis; exopod well developed bearing 3–4 terminal plumose setae; exopod exclusive of setae extending nearly one-half length of endopod; arthrobranch absent.

Pereopod 1 not extending to distal end of antennal scale; fingers weakly bifid and approximately same length as palm; chela subequal to carpus in length; merus slightly longer than carpus. Pereopods 2 similar or occasionally dissimilar (one chela slightly more robust), both overreaching antennal scale by approximately length of fingers; fingers lacking teeth, having straight cutting edges, and equal in length to palm; carpus slightly shorter than chela, subequal to merus; ischium and merus equal in length. Pereopods 3–5 (Fig. 3c–f) nearly equal in size and shape, dactyls entire (not bifid), propodi with single spine on distal flexor margin. Pereopod 3 not extending to distal end of antennal scale; propodus 2.8 times length of dactyl and slightly more than twice length of carpus and ischium, with single distal spines on flexor margin; merus subequal in length to propodus. Pereopod 4 extending to distal end of second segment of antennular peduncle; propodus 2.8 times length of dactyl and slightly more than twice lengths of carpus and ischium; merus subequal in length to propodus. Pereopod 5 extending to proximal end of second segment of an-

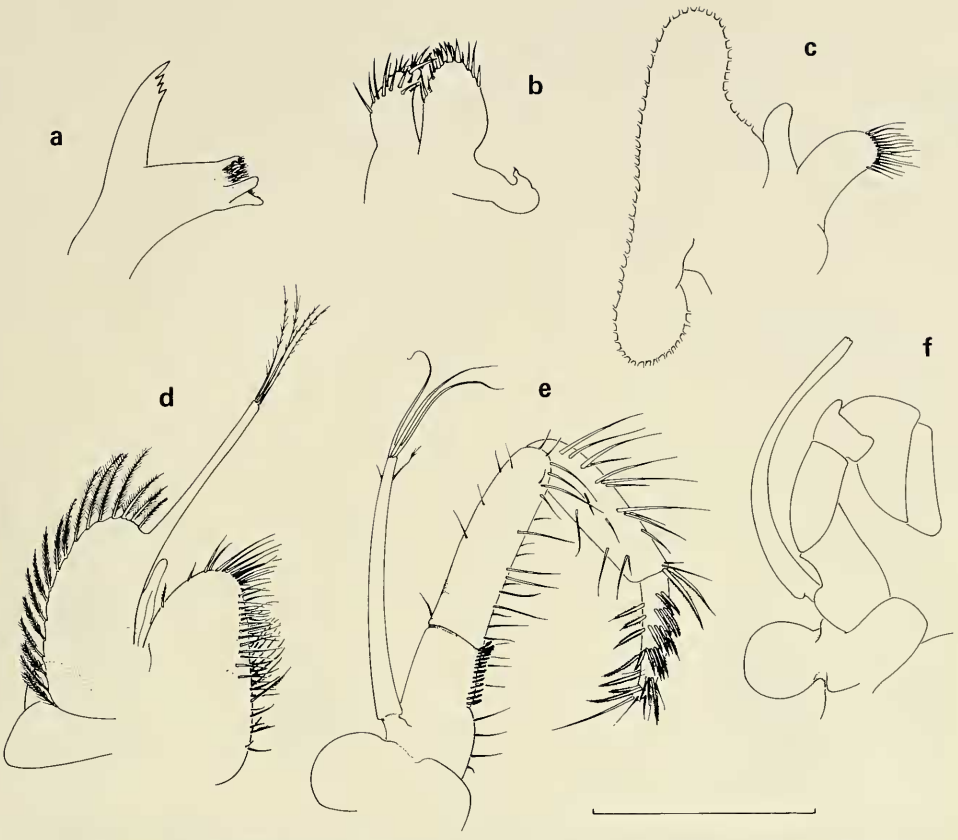

Fig. 2. *Periclimenes patae,* new species. Mouth parts. a, mandible; b, maxilla 1; c, maxilla 2; d, maxilliped 1; e, maxilliped 3; f, maxilliped 2 (setation omitted). Scale equals 0.5 mm.

tennular peduncle; propodus and merus equal in length and 2.8 times length of dactyl; ischium 0.25 times longer than carpus; propodus with single row of comb setae on distolateral margin (Fig. 3f).

Uropodal exopods extending beyond telson for 0.2 times their length; strong movable spine between distolateral tooth and blade; movable spine distinctly longer than distolateral spine (Fig. 3h). Ovigerous females bearing 10–35 eggs. Eggs, depending on stage of development, range from 0.5 (undeveloped) to 0.7 mm (hatching stage) in maximum length.

Male.—Adults usually smaller (CL 2.2–3.2 mm), less robust, and with relatively larger pleopods than adult females. Rostrum relatively smaller than in female, not reaching beyond basal segment of antennular peduncle; typically armed with 4 dorsal teeth, less often with 5, and rarely 3 (Fig. 4a–d). More (15–20) clusters of antennular aesthetascs on large adult males than on large adult females. Appendix masculina (Fig. 3g) armed with 2–3 weakly serrate, apical and subapical spine-like setae; 3–5 simple spine-like setae along inner margin, distal-most usually subapical. Resemblance is similar to females in other respects.

Coloration.—The overall appearance of juveniles and adults in life is clear or transparent. The following description is of an adult ovigerous female. Pleopods clear. Pereopods clear except for a few patternless spots of aquamarine confined mainly to pereopods 2 and 5. Coxa and basis of all pereo-

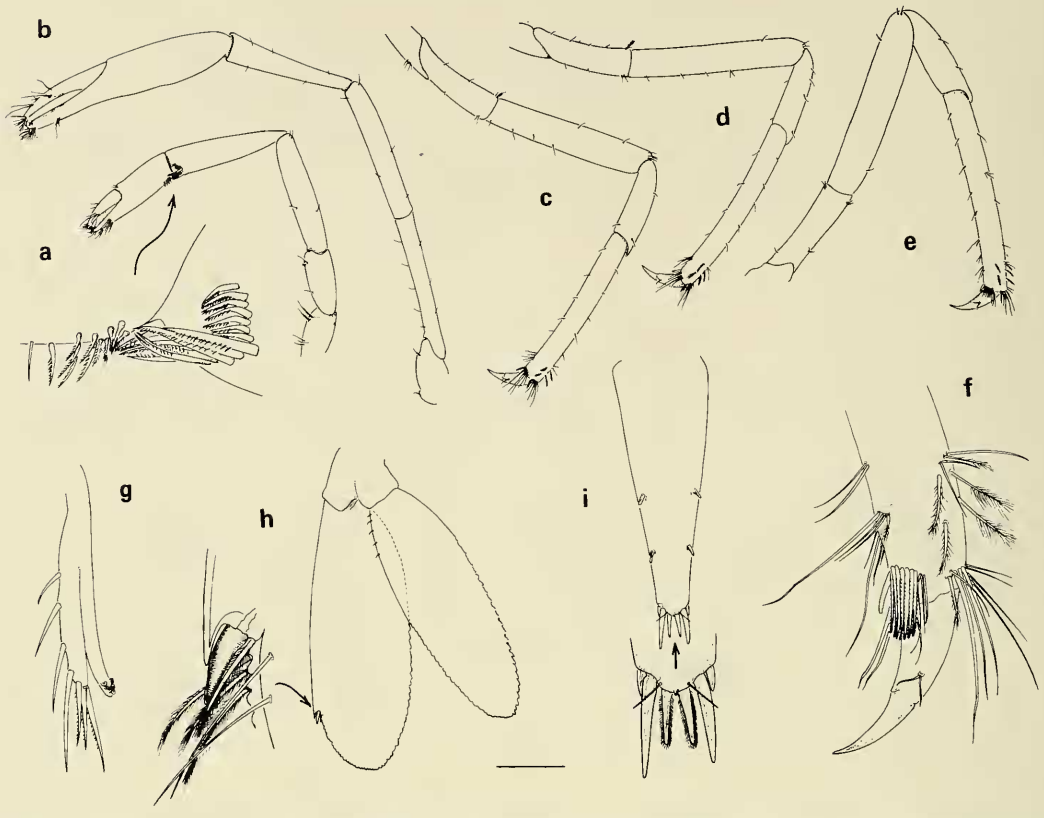

Fig. 3. *Periclimenes patae,* new species. a–e, pereopods 1–5; f, enlargement of dactyl and distal part of pereopod 5; g, appendix interna and appendix masculina from adult male; h, left uropod; i, telson. Scales equal 0.5 mm (a–e, h, i), and 0.1 mm (f, g).

pods with pale orange spots, coxa of pereopod 4 with a few spots of aquamarine. Cornea black with translucent golden covering, with dark reddish accessory pigment spot on proximal margin. Eyestalks with small, widely dispersed reddish orange spots mingled with fewer spots of pale orange. Suborbital area with squiggly aquamarine markings and intermingled spots of orange and aquamarine. Antennular peduncle traversed by two bands of pale orange, one slightly posterior to stylocerite, the other at posterior base of second antennular segment. Outer and inner antennular flagella and antennal scale with a few small russet spots. Antennular flagella and carapace clear. Antennal flagellum with light reddish orange bands.

Habitat.—Associated with the slimy sea plume (*Pseudopterogorgia americana*) and other gorgonians in depths of 1 to 12 m.

Distribution.—Off Pine Cay, Turks and Caicos Islands (British West Indies) and off Looe Key, Florida Keys, Florida.

Etymology.—The species is named for Patricia (Pat) Bubucis in recognition of her many contributions to our studies on the fauna of the Turks and Caicos Islands.

Remarks.—*Periclimenes patae* appears to be most closely related to *P. iridescens,* a species originally described by Lebour (1949) from a single adult female netted off Bermuda over water 180–200 m deep. Since its original description, *P. iridescens* has been reported from the western North Atlantic off Venezuela (Holthuis 1951), Tobago

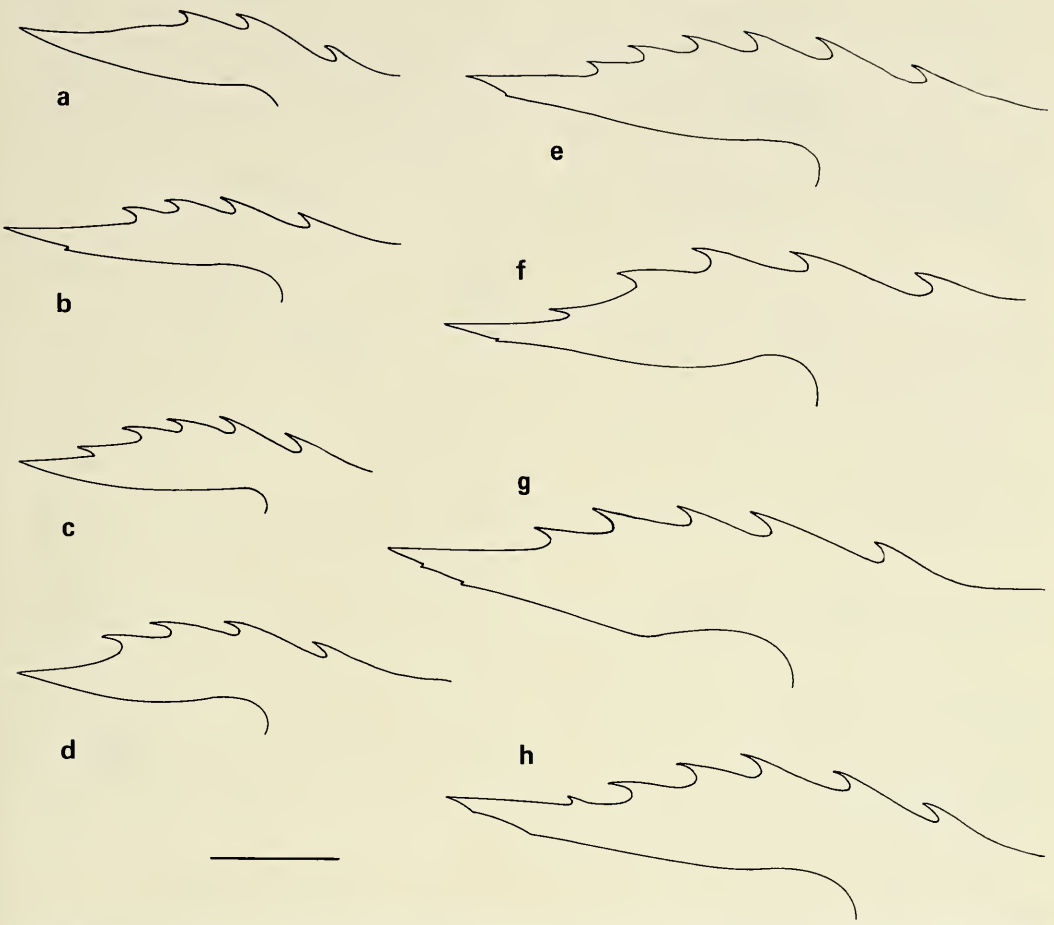

Fig. 4. *Periclimenes patae,* new species. Variation in the rostrums of adults. a–d, males; e–h, females. Scale equals 0.5 mm.

(Chace 1972), Curaçao (Criales 1980), Colombia (Criales 1984), Florida Gulf coast (Hopkins et al. 1977, Herbst et al. 1979, Williams 1984), and Cape Hatteras, North Carolina (Herbst et al. 1979, Williams 1984).

Periclimenes patae can be distinguished from the holotype of *P. iridescens* by having fewer rostral teeth (3–6), second pereopods equal or nearly equal in size and development, chelae of second pereopods lacking distinct tooth or teeth, dactyls entire (not bifid) on pereopods 3–5, and pereopods 3–5 each with single spine seta on the distoflexor margin of the propodus. Based on Lebour's (1949) description and our reexamination of the type specimen, *P. iridescens* (Fig. 5a–f) is characterized by: (1) seven dorsal teeth on rostrum (Fig. 5a, b), (2) distinctly unequal second pereopods, (3) a single rounded tooth on the dactyl of the major chela (Fig. 5d), (4) the dactyl of the major chela curving over and extending well beyond the fixed finger (Fig. 5d), (5) pereopods 3–5 having distinctly bifid dactyls (Fig. 5f), and (6) pereopods 3–5 each with 3 (Fig. 5f) or more sets of spine setae along distal third of propodal flexor margin. Additionally, Lebour's (1949) color notes suggest that *P. iridescens* is brightly "iridescent" in life. In contrast, *P. patae* is nearly transparent in life and does not appear iridescent.

The possibility of one or more unde-

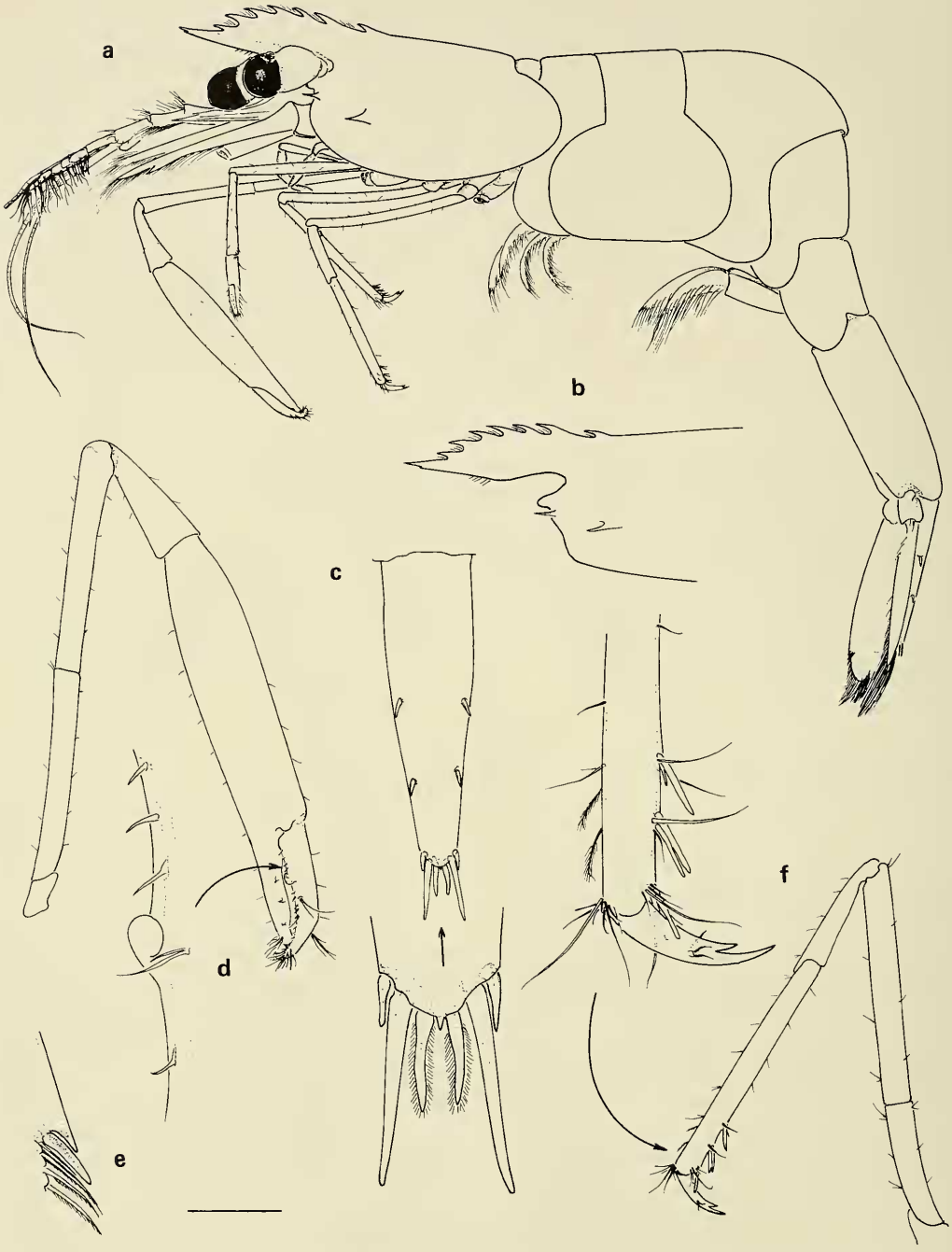

Fig. 5. *Periclimenes iridescens* (female holotype, BMNH). a, lateral view (right pereopods 3–5 and left pereopods 2 and 5 missing); b, lateral view of carapace; c, telson with enlargement of posterior tip; d, right pereopod 2 (major chela) with enlargement of tooth on dactyl; e, moveable spine on uropodal exopod; f, left pereopod 3, enlargement of dactyl and distal part of propodus. Scales equal 1.0 mm (a, b), 0.5 mm (c, d, f), and 0.2 mm (e).

scribed species within the "iridescens" complex was suggested by Herbst et al. (1979) and Criales (1980, 1984), who reported considerable variation in the specimens considered to be *P. iridescens.* Holthuis (1951) reported variation in the dactyls of the Venezuelan specimens that he assigned to *P. iridescens.* Some of his specimens had pereopods 3–5 with dactyls entire; others were transitional between entire and distinctly bifid. His material, like the holotype of *P. iridescens,* had distinctly dissimilar second pereopods, but the fingers of the major chelae, unlike those of the holotype, bore 2–3 teeth.

We examined the holotype of *P. iridescens,* the material examined by Holthuis (1951) and Herbst et al. (1979), and specimens from the Gulf of Mexico, Florida Keys, and deeper water off Pine Cay. In addition to *P. iridescens* and *P. patae,* we now believe that at least four closely related and undescribed species within the "iridescens" complex exist in the western North Atlantic. Descriptions of three of these new species are now in preparation.

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